



DATA MANAGEMENT



Steve Williams

**NCAR Earth Observing Laboratory,
Boulder, Colorado, USA**

GCOS Reference Upper Air Network (GRAUN)

Implementation Meeting

Lindenberg, Germany

26-28 February 2008

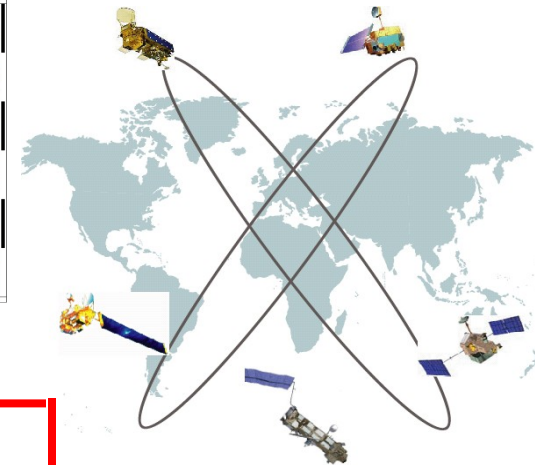
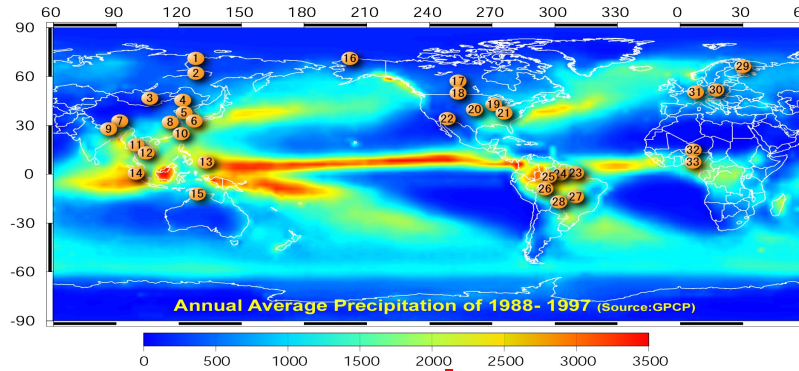
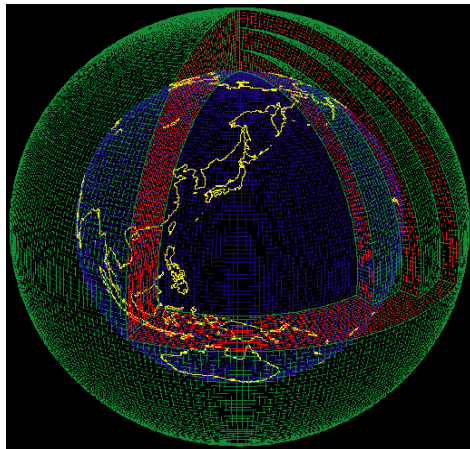
EOL CEOP work supported by NOAA Climate Projects Office



Coordinated Energy and water-cycle Observations Project

Unique Capabilities

A Well Organized Data Archive System_



Model Output Data Archiving
Center at the **World Data Center
for Climate, Max-Planck
Institute for Meteorology** of
Germany

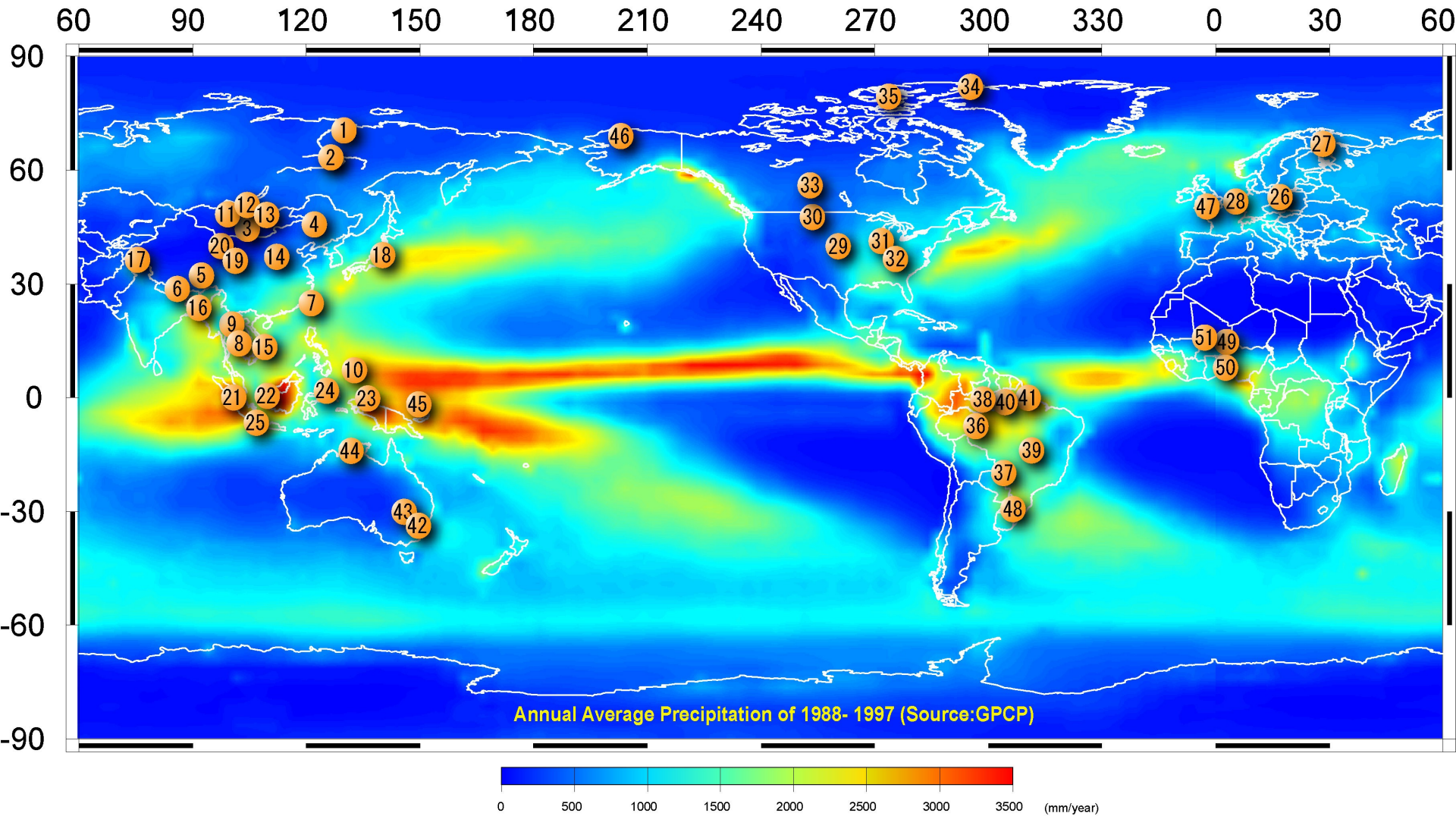
In-Situ Data Archiving
Center at **NCAR (National
Center for Atmospheric
Research)** of USA

Data
Integrating/Archiving
Center at **University of
Tokyo and JAXA** of
Japan





CEOP Reference Site Map



Proposed CEOP Phase 2 Reference Sites

CSE/ RHP	Ref #	Ref. Site Name	Latitude			Longitude			CSE/ RHP	Ref #	Ref. Site Name	Latitude			Longitude		
MAHA SRI/(C AMP)	1	Eastern Siberian Tundra	71.617	N	128.750	E	BALTEX	26	Lindenberg	52.170	N	14.120	E				
	2	Eastern Siberian Taiga	62.255	N	129.618	E		27	Sodankyla	67.370	N	26.633	E				
	3	Mongolia	45.743	N	106.264	E		28	Cabauw	51.970	N	4.930	E				
	4	Tongyu	44.416	N	122.867	E	CPPA /GAPP	29	ARM/Southern Great Plains	36.610	N	97.490	W				
	5	Tibet	31.370	N	91.900	E		30	Fort Peck	48.310	N	105.100	W				
	6	Himalayas	27.959	N	86.813	E		31	Bondville	40.010	N	88.290	W				
	7	Northern South China Sea - Southern Japan	24.967	N	121.181	E		32	Oak Ridge	35.960	N	84.290	W				
	8	Chao-Phraya River	18.400	N	99.470	E	CLIC	33	BERMS (MAGS)	53.990	N	105.120	W				
	9	North-East Thailand	14.466	N	102.379	E		34	Alert, Nunavut	82.467	N	62.500	W				
	10	Western Pacific Ocean	7.452	N	134.476	E		35	Eureka, Nunavut	79.995	N	85.813	W				
	11	Mongol Arvayheer	46.246	N	102.798	E	LBA	36	Rondonia	10.080	S	61.930	W				
	12	Mongol Nalaikh	47.766	N	107.336	E		37	Pantanal	19.560	S	57.010	W				
	13	Northern Mongolia	47.213	N	108.742	E		38	Manaus	2.610	S	60.210	W				
	14	Downstream of the Yellow River	36.649	N	116.054	E		39	Brasilia	15.930	S	47.920	W				
	15	Central Vietnam	16.033	N	109.185	E		40	Santarem	3.020	S	54.970	W				
	16	Northeast Bangladesh	24.900	N	91.893	E	41	Caxiuana	1.710	S	51.510	W					
	17	Pakistan Karakorum Network	35.728	N	76.286	E	MDB	42	Tumbarumba (tower)	35.660	S	148.150	E				
	18	Tsukuba	36.110	N	140.100	E		43	Murrumbidgee (soil moisture, tempera	35.116	S	146.375	E				
	19	Lanzhou	35.946	N	104.137	E	Others	44	ARM/Tropical West Pacific (Manus)	2.060	S	147.430	E				
	20	Heihe River Basin	39.500	N	100.000	E		45	ARM/Tropical West Pacific (Darwin)	12.430	S	130.890	E				
	21	Western Maritime Continent	0.200	S	100.300	E		46	ARM/Northern Slope of Alaska	71.320	N	156.620	W				
	22	Central Maritime Continent	0.000	S	109.400	E		47	Chilbolton, UK	51.150	N	1.433	W				
	23	Eastern Maritime Continent	1.200	S	136.100	E	LPB	48	Cruz Alta	28.600	S	53.400	W				
	24	Northern Maritime Continent	1.500	N	124.900	E	AMMA	49	Niamey	13.530	N	2.660	E				
	25	Southern Maritime Continent	6.400	S	106.700	E		50	Ouémé	9.692	N	1.662	E				
						51		Gourma	15.300	N	1.500	W					

REFERENCE SITE DESCRIPTION

1D Site:

Near surface + surface + sub-surface (Atmospheric sounding* is highly desirable)

2.5D Site:

A few 1D sites + surface heterogeneity with an area of at least 100km²

3D Site:

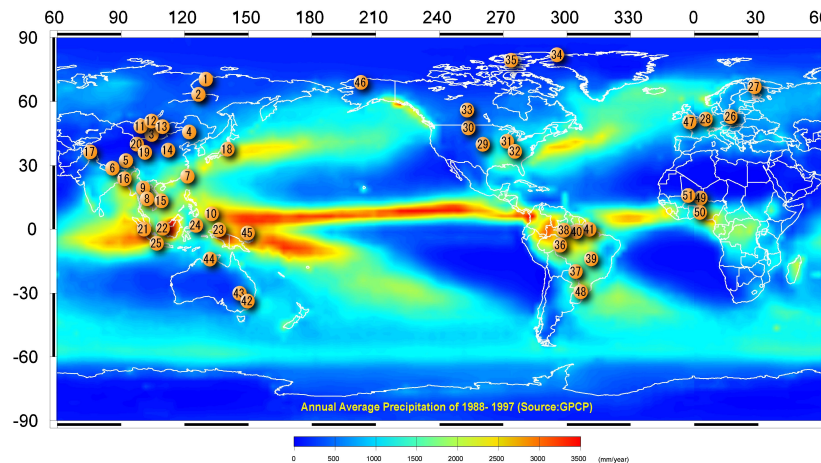
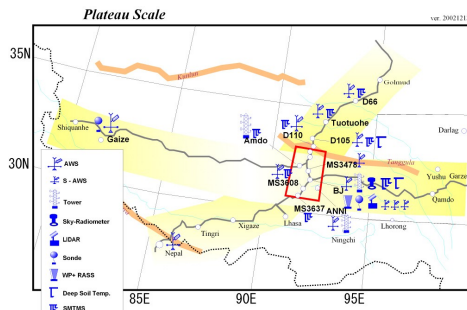
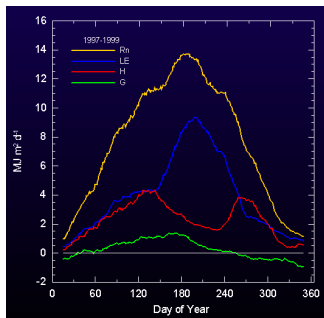
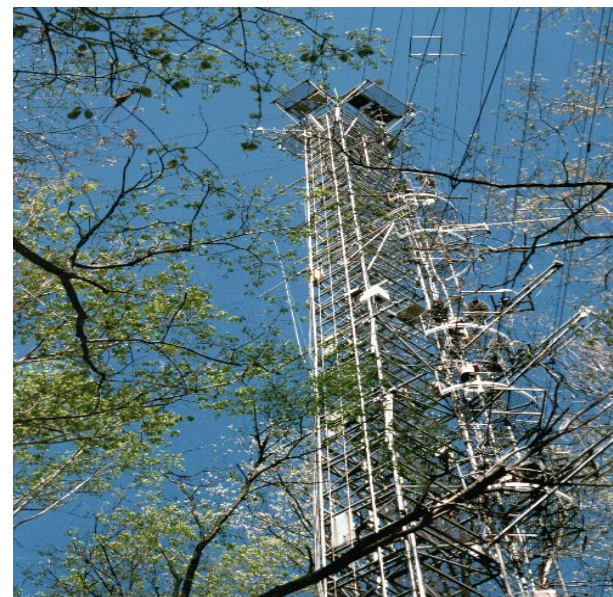
1D sites network (+3D system) or 2.5D site + 3D atmosphere** with an area of about 10⁴ km²

The terminology in summarizing these sites is used in the following manner:

- ◆ **Sub-surface (0 to -1m):** Soil moisture and temperature profile, heat conduction and soil characteristics;
- ◆ **Surface (0 to +2m):** Four-component radiation, PAR, surface temperature, surface soil moisture, precipitation, vegetation type characteristics, snow;
- ◆ **Near surface(+2 to +10m):** Temperature, specific humidity and wind speed profiles, surface pressure, momentum, latent and sensible heat fluxes;

* Atmospheric soundings: Radiosonde, wind profile, LIDAR microwave rain radar

** 3D atmosphere: 3D Doppler radar, cloud radar, aerosonde aircraft.





Lindenberg Reference Site



STATION NAME:

Falkenberg

CONTACT:

Name: Dr. Frank Beyrich

Affiliation:

Meteorologisches Observatorium Lindenberg
Deutscher Wetterdienst (DWD)

Address:

Am Observatorium 12
D - 15848 Tauche - OT Lindenberg
Germany

E-mail: frank.beyrich AT dwd DOT de

Telephone: +49 33677 60228

Fax: +49 33677 60280

WEB PAGES:

- ♦ [Lindenberg Meteorological Observatory Web Page](#)
- ♦ [BALTEX Home Page](#)

STATION LOCATION:

All meteorological, radiation, soil, tower and flux measurements have been performed at the Falkenberg Boundary Layer Field Site of the Meteorological Observatory Lindenberg (MOL).

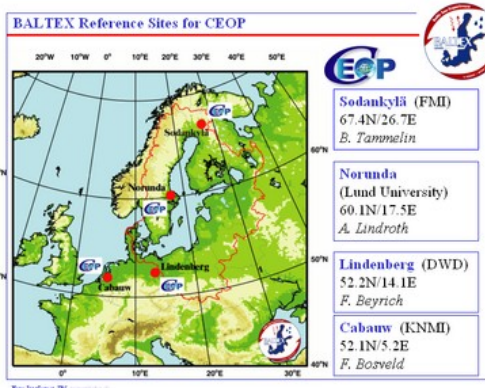
The coordinates of the GM Falkenberg are given by:

52° 10' 01" N (52.17°N) and 14° 07' 27" E (14.12°E) at 73 m elevation.

The radiosondes are released at the site of the Meteorological Observatory Lindenberg (MOL) which is about 5 km to the North of the Falkenberg site.

The co-ordinates of the MOL are given by:

52° 12' 36" N (52.21°N) and 14° 07' 12" E (14.12°E) at 112 m elevation.



STATION DESCRIPTION:

Individual Site Metadata includes:

- Station (s)
- Contact (s)
- Links to relevant web pages
- Station location (e.g. maps, photos, Google Earth files)
- Station description (e.g. vegetation characteristics, soil types, climate)
- Parameters and Instrumentation descriptions (SFC, TWR, STM, FLX, UA)
- Links to presentations
- Links to data sets and additional documentation



Data exchange guidelines:

- To comply with WMO Resolutions 40 (CG-XII) and 25 (CG-XIII) in particular: No financial implications.
- (2) CDA and *data users*: Commercial exploitation of CEOP data is prohibited.
 - (3) *Data users*: No transfer to third parties.
 - (4) Data release to *data users*: Turn-around period.
Category 1 data: 6 months Category 2 data: 15 months
 - (5) Acknowledgement and citation
 - (6) Co-Authorship for Reference Sites' PIs recommended, collaboration base required if PI requests co-authorship
(in particular for *category 2 data*)
 - (7) CEOP Publication Library at CDA

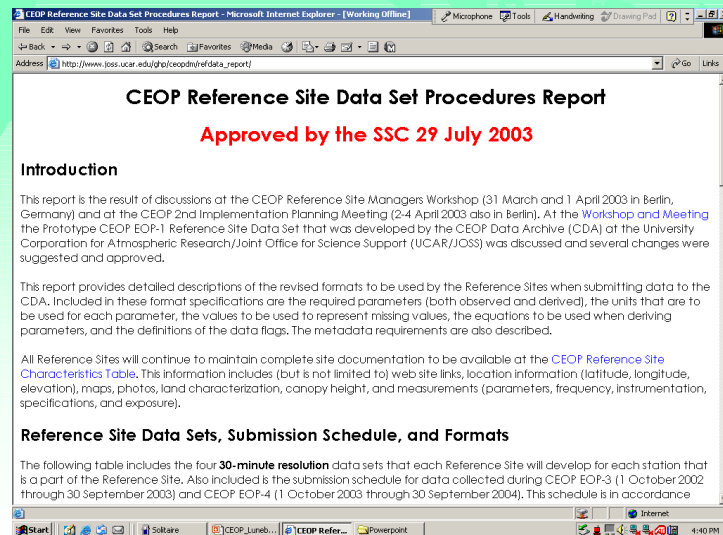


Reference Site Data Set Procedures Report

(Approved by the SSC on 29 July 2003)

- Introduction
- Data Set Description, submission schedule, formats
- Metadata
- Gap filling
- Quality Control/Quality Assurance
- File naming convention
- Submission instructions to CDA
- CDA Composite formation
- CDA Quality Assurance
- Rawinsonde Data Sets
- Ancillary Data Sets

Data Set	Data Category	Submission Date (First Half EOP-3)	Submission Date (Second Half EOP-3)	Submission Date (First Half EOP-4)	Submission Date (Second Half EOP-4)	Detailed Format Description
Surface Meteorological and Radiation Data Set	Category 1	1 October 2003	1 April 2004	1 October 2004	1 April 2005	Surface Meteorological and Radiation Format
Flux Data Set	Category 2	1 July 2004	1 January 2005	1 July 2005	1 January 2006	Flux Format
Soil Temperature and Soil Moisture Data Set	Category 1	1 October 2003	1 April 2004	1 October 2004	1 April 2005	Soil Temperature and Soil Moisture Format
Meteorological Tower Data Set	Category 1	1 October 2003	1 April 2004	1 October 2004	1 April 2005	Meteorological Tower Format



CEOP Reference Site Data Set Procedures Report
Approved by the SSC 29 July 2003

Introduction

This report is the result of discussions at the CEOP Reference Site Managers Workshop (31 March and 1 April 2003 in Berlin, Germany) and at the CEOP 2nd Implementation Planning Meeting (2-4 April 2003 also in Berlin). At the Workshop and Meeting the Prototype CEOP EOP-1 Reference Site Data Set that was developed by the CEOP Data Archive (CDA) at the University Corporation for Atmospheric Research/Joint Office for Science Support (UCAR/JOSS) was discussed and several changes were suggested and approved.

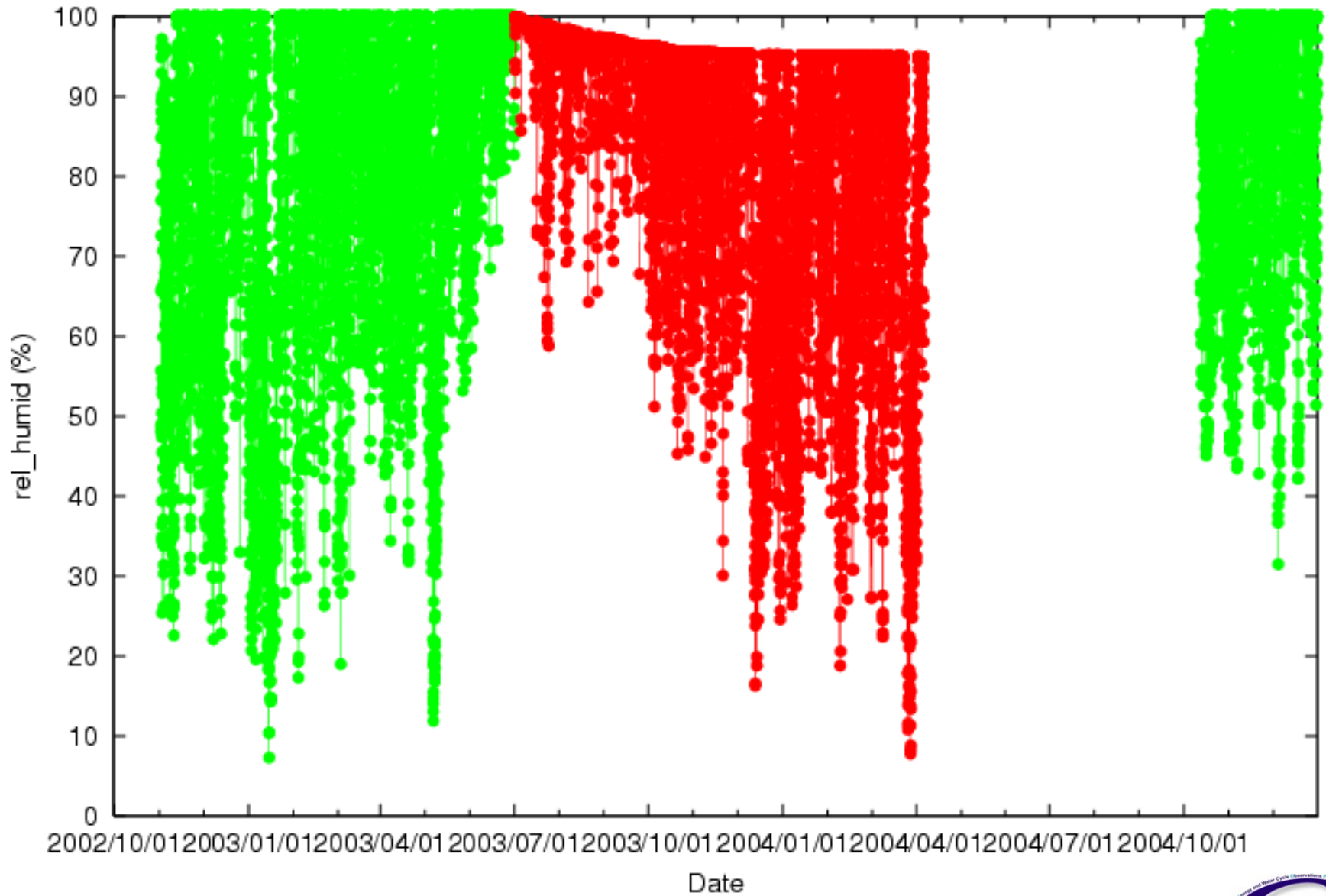
This report provides detailed descriptions of the revised formats to be used by the Reference Sites when submitting data to the CDA. Included in these format specifications are the required parameters (both observed and derived), the units that are to be used for each parameter, the values to be used to represent missing values, the equations to be used when deriving parameters, and the definitions of the data flags. The metadata requirements are also described.

All Reference Sites will continue to maintain complete site documentation to be available at the [CEOP Reference Site Characteristics Table](#). This information includes (but is not limited to) web site links, location information (latitude, longitude, elevation), maps, photos, land characterization, canopy height, and measurements (parameters, frequency, instrumentation, specifications, and exposure).

Reference Site Data Sets, Submission Schedule, and Formats

The following table includes the four **30-minute resolution** data sets that each Reference Site will develop for each station that is a part of the Reference Site. Also included is the submission schedule for data collected during CEOP EOP-3 (1 October 2002 through 30 September 2003) and CEOP EOP-4 (1 October 2003 through 30 September 2004). This schedule is in accordance

EXAMPLE OF CALIBRATION DRIFT



EOL Quality Control of Dropsonde Data

1. In flight data inspection

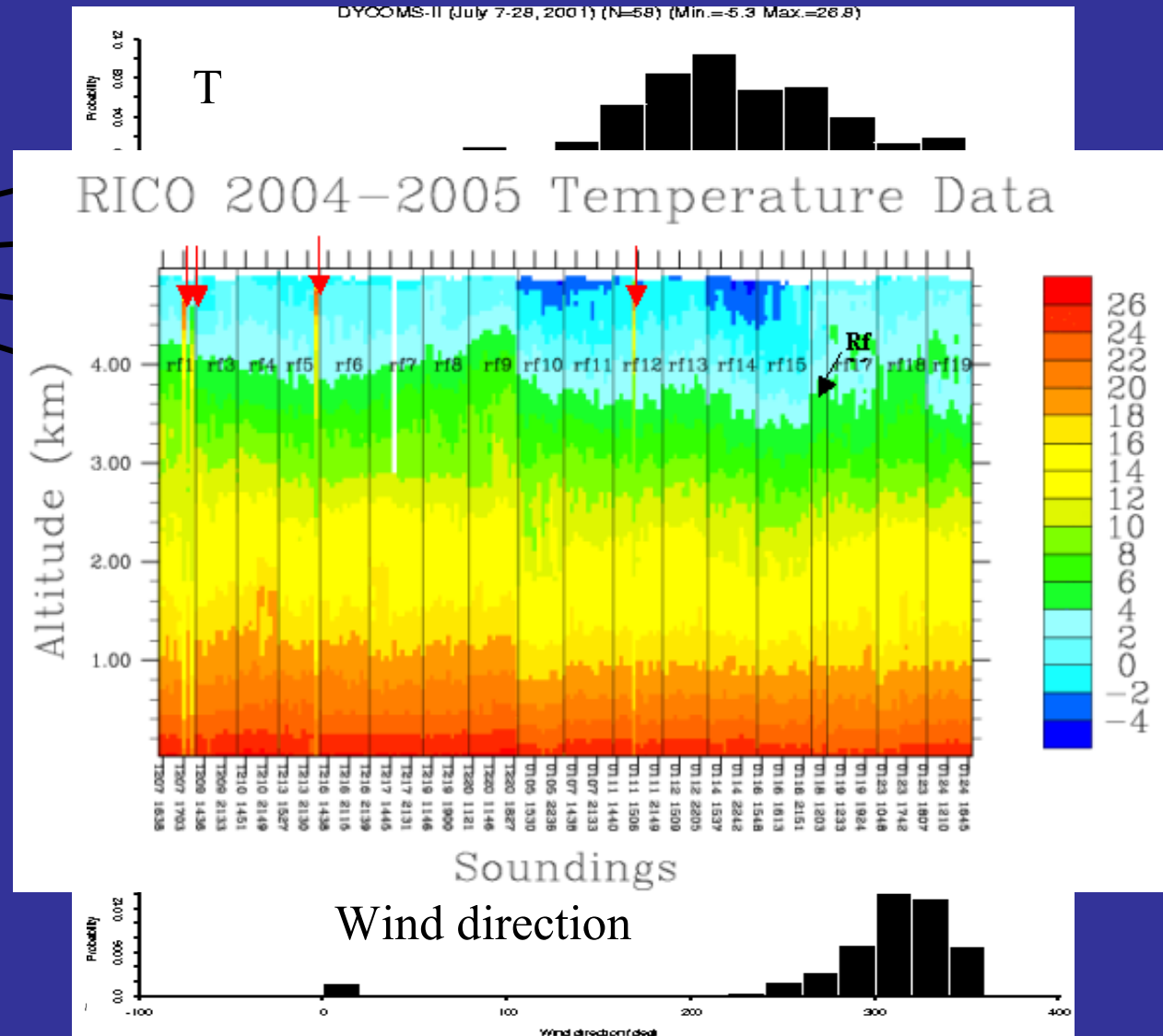
2. ASPEN

3. Individual Skew-t Examination

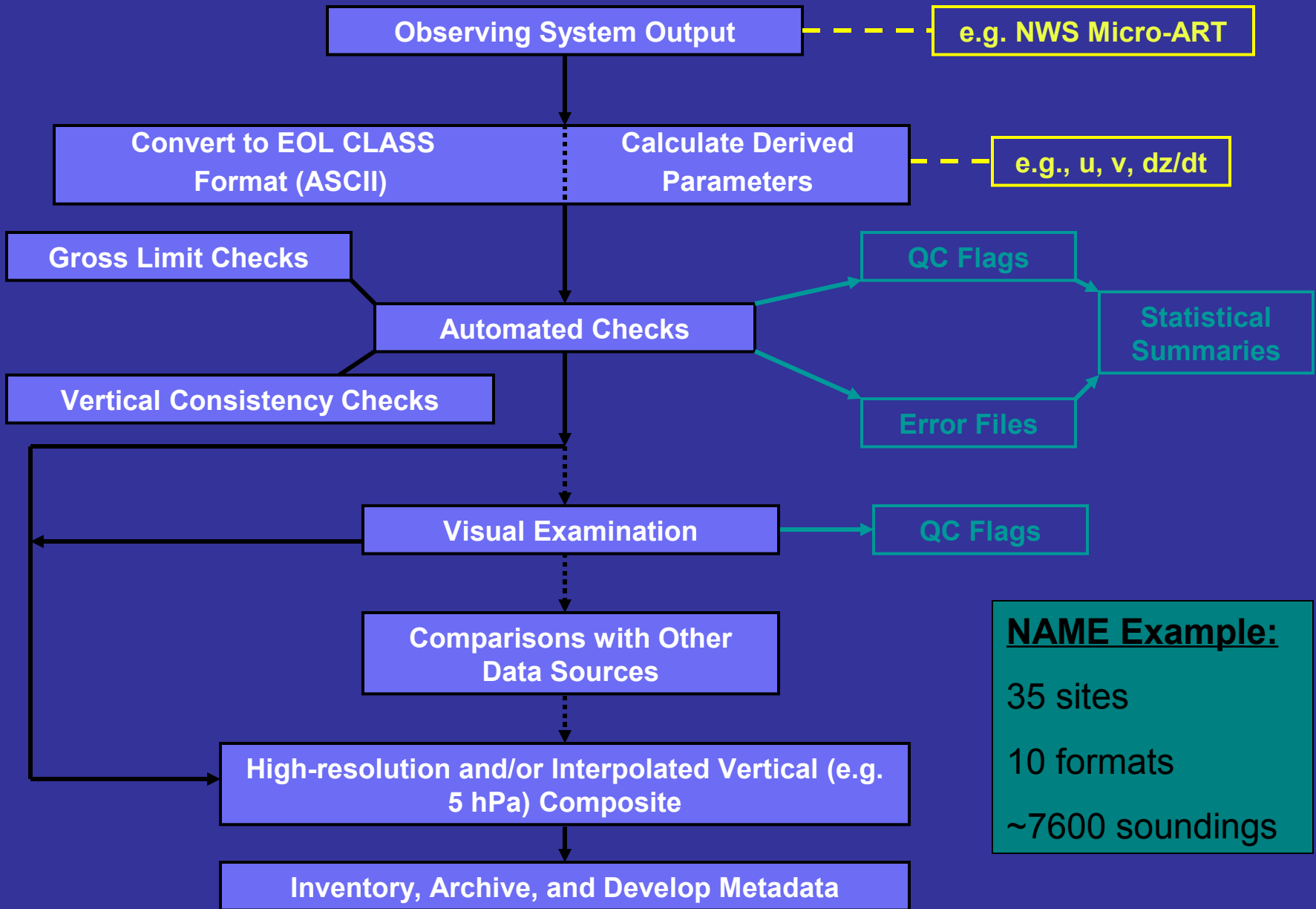
4. Histograms of PTU and Wind

5. Time series of PTU and Wind

6. Comparisons with other data

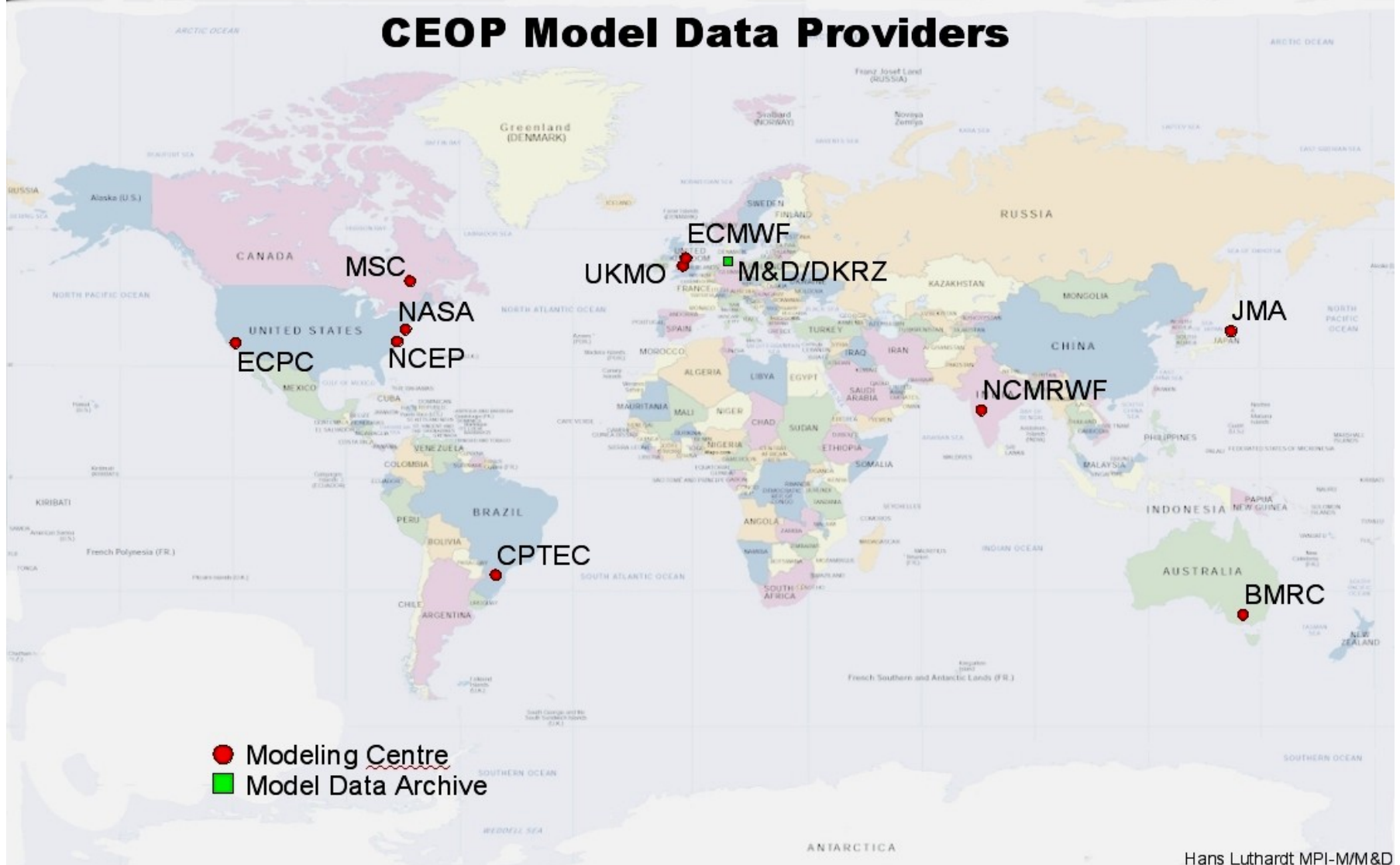


NCAR/EOL Atmospheric Sounding Processing Procedures



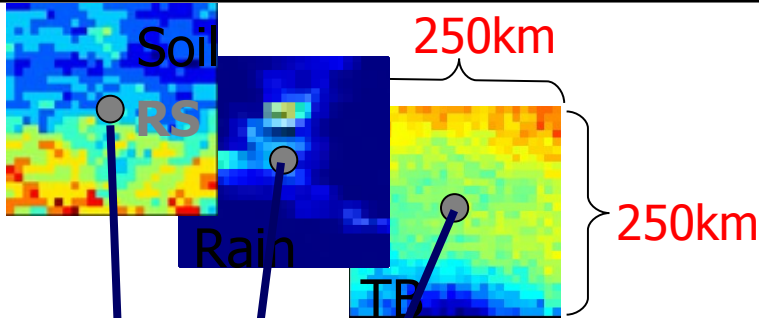


CEOP Model Data Providers

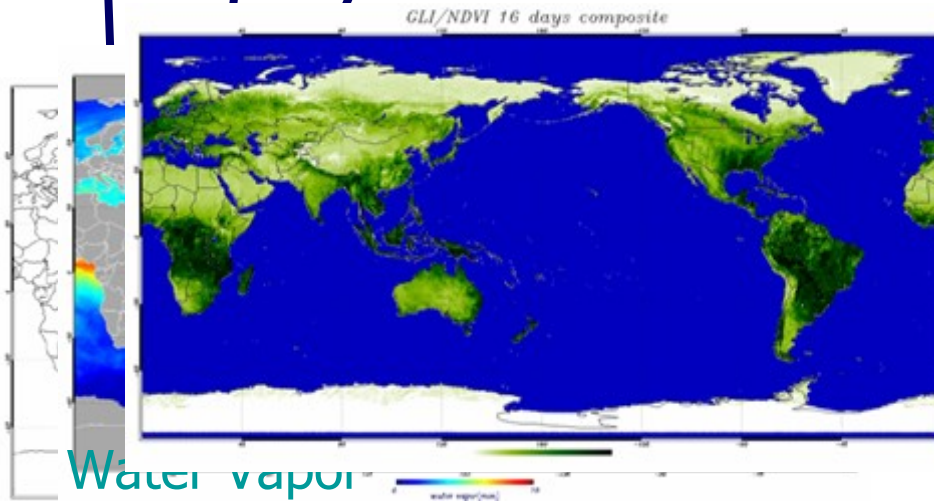


3 Types scale of Satellite datasets

1. Reference site: 35 Points

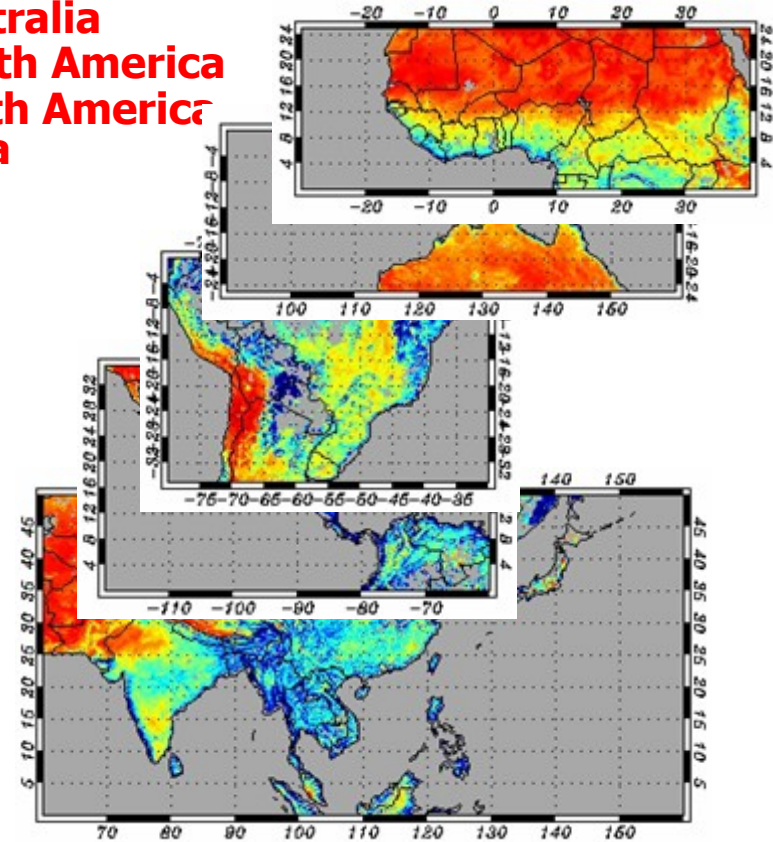


3. Global



2. Monsoon Region

- > North Africa
- > Australia
- > South America
- > North America
- > Asia



<http://www.eol.ucar.edu/projects/ceop/dm/>



INTEGRATED



CEOP Data Access

Integrated Data Servers

WTF-CEOP Distributed Data Integration Prototype System
CEOP Centralized Data Integration System
GCMD CEOP Portal

In-Situ

Data Sets

CEOP EOP-3/4 Data Sets
CEOP EOP-1 Data Sets
NASA/GMAO GRADS/DODS Server
Baseline Surface Radiation Network (BSRN)
GEWEX Land Processes Database Map Server
IAEA Global Network of Isotopes in Precipitation

Information

CEOP Reference Site Data Set Procedures Report
CEOP Reference Site Station Characteristics
Virtual Tour of Reference Sites Slideshow
CEOP Reference Site Map
CEOP Hydrology Reference Sites
Reference Site Data Management Update (GEWEX SSG Meeting, 20-24 January 2003)
CEOP In-Situ Data Source Agency Links

Satellite

Data Sets

EOP-1 Satellite Data Sets
NASA/GMAO GRADS/DODS ISCCP Surface T and Cloud Amount for CEOP EOP1
NOAA CLASS Archive
TRMM Online Visualization and Analysis System

Information

CEOP Satellite Data Source Agency Links

Model

Data Sets and Information

Model Output and Information

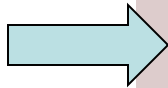
IN-SITU



SATELLITE



MODEL



CEOP Documentation

Data Policies

CEOP Reference Sites Data Release Guidelines
BALTEX
CAMP
AMMA
GAPP
LBA
MAGS

Data Standards Information

CEOP Metadata Design (Proposed)
National Spatial Data Infrastructure (NSDI) Presentation (September 2004)
Assistance for Land-surface Modelling activities (ALMA)
Atmospheric Model Intercomparison Project (AMIP)
ISO/TC 211

Documents

CEOP Implementation Plan
3rd Implementation Planning Meeting Report (March 2004)
Executive Summary
Appendices
2nd Implementation Planning Meeting Report (July 2003)
WESP Major Activities Plan (1 June 2003)
Establishment of a Global Hydrological Observation Network for Climate" GCOS/GTOS/HWRP Meeting Report (June 2000)

Questionnaires

CEOP Land Cover and Soils Questionnaire Responses
CEOP Frozen Precipitation Questionnaire Responses
CEOP Reference Site Rawinsonde Station Responses

Other Links

CEOP Home Page
WCRP Home Page
GEWEX Home Page
CLIVAR Home Page
CLIC Home Page
ACSYS Home Page
Global Modeling and Assimilation Office (NASA/GSFC)
Land Information System (NASA/GSFC)
Model Parameter Estimation Experiment (MOPEX)
NASA/Goddard Institute for Space Studies (GISS) Data
International Atomic Energy Agency (IAEA)
IAEA Isotope Hydrology Section





SOME *IN-SITU* DATA NETWORK LESSONS LEARNED FROM CEOP.....

- Start Small with a few well organized and committed sites
- Balance science and “reality” into site selection
- Establish a workable detailed data policy early on
- Inventory sites → Good complete metadata a MUST
- Improved interoperability between data centers → data lag
- Will encounter numerous data quality problems and issues
- Large level of additional effort required by sites
- Establish standardized procedures and good coordination

The importance of Quality Assurance in Data Management!

